

Palisota flagelliflora (Commelinaceae), a New Species from Cameroon with a Unique Habit

Robert B. Faden

Department of Botany, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560, U.S.A.

ABSTRACT. *Palisota flagelliflora* Faden (Commelinaceae), a rosette species, is unique in *Palisota* in bearing its inflorescences on axillary, flagelliform shoots that lie on the forest floor. These shoots continue to grow sympodially and give rise to additional inflorescences or viviparously produce a new rosette. Other rare or unique features include: inflorescences composed of single cincinni, long pedicels, often vertical flowers, yellow staminode filament hairs, bearded filament and connective in the unpaired stamen, and bearded style.

The genus *Palisota* Reichenbach f. ex Endlicher, with ca. 18 species (Faden & Hunt, 1991), is the largest African genus of Commelinaceae occurring predominantly in forests (Faden, 1983). Its center of diversity is Central Africa, especially Cameroon and Gabon. Until recently, all described species were either acaulescent rosette plants or herbaceous shrubs, and all had terminal or terminal and axillary, thyriform inflorescences. Recently described species (Brenan, 1984) have habits and inflorescences that depart from these types, including a decumbent habit and strictly axillary inflorescences. A unique habit, rosettes producing flagelliform flowering shoots, is described below in the new species *P. flagelliflora*.

Palisota flagelliflora Faden, sp. nov. TYPE: Cameroon. South Prov. [South-Central Prov.]: Kribi-Lolodorf road 3.5 km along the road to Edéa that branches off to the N at km 18 (just past Bissiang), 200 m on a track that branches off the Bissiang-Edéa road, 3°02'N, 10°02'E, exploited forest with much of the structure and understory vegetation remaining, nearby pure stand of *Cecropia* (*Musanga*) *cecropioides* along the Bissiang-Edéa road, 29 Jan. 1986, Faden & Mbamba 86/50 (holotype, US sheet no. 3264040; isotypes, B, BR, C, COI, G, GC, HBG, IEC, K(3), LISC, MA, MO, P, S, UPS, US(4), WAG, YA(2)). Field-collected inflorescences and fruits, preserved in FAA (US vial B470), are part of the type collection. Figures 1, 2.

Herbae perennes foliis rosulatis, 14–50 cm longis, 3.5–10(–11) cm latis, lamina elliptica vel oblongo-elliptica ad oblanceolatam vel obovatam, 10–40 cm longa; inflorescentiis terminalibus et bracteis oppositis in surculis axillaribus, flagelliformibus (1.5–)25–100(–175) cm longis, cincinnis solitariis et contractis, bracteis binatis subtentis compositis; floribus bisexualibus et masculis, stamine impari apice filamenti et in connectivo barbato, sacculo antherae in flore bisexuali indehiscenti, in flore masculo dehiscenti, ovulis biseriatis; fructibus triangulato-ellipsoideis ad triangulato-ovoideos, apice acuto ad rostratum, 1.4–2.3 cm longis, 0.9–1.2 cm latis, coccineis vel rubiginosis, dense pilosis; seminibus uni- vel biseriatis.

Perennial with a rhizome to 15 cm long, frequently producing offsets, leaves all or mainly in rosettes, petiolate, 14–50 cm long, 3.5–10(–11) cm wide, petiole 4–19 cm long, appressed pubescent, lamina elliptic or oblong-elliptic to oblanceolate or obovate, 10–40 cm long, apex abruptly acute or acuminate, base cuneate to attenuate, surfaces discolorous, adaxial green, glabrous or appressed whitish sericeous and glabrescent (this pubescence ± persistent in cultivation), abaxial persistently appressed whitish sericeous. Inflorescences terminal, usually becoming bract-opposed, pedunculate, borne on axillary, leafless, bracteate, flagelliform shoots (1.5–)25–100(–175) cm long, at first ascending, soon becoming prostrate and creeping through the leaf litter, rarely obviously branched, rarely rooting, many-noded, extending sympodially from the axil of the bract subtending the peduncle, the flagelliform shoot in this manner often producing a succession of terminal/bract-opposed inflorescences, often viviparously producing a new rosette distally; internodes appressed sericeous, nodes covered by persistent maroon bracts 1.5–4 cm long, appressed whitish sericeous; peduncle 1–8.5 cm long, usually appressed sericeous, sometimes densely lanate; each inflorescence consisting of a single contracted, several-flowered cincinnus subtended by a pair of maroon bracts 1.5–2.5 cm long, similar in shape, color, and pubescence to those of the flagelliform shoot. Flowers bisexual and male, predominantly vertical or with the unpaired (outer) sepal uppermost, occasionally horizontal, ca. 15–18 mm wide, odorless; pedicels erect in flower, be-

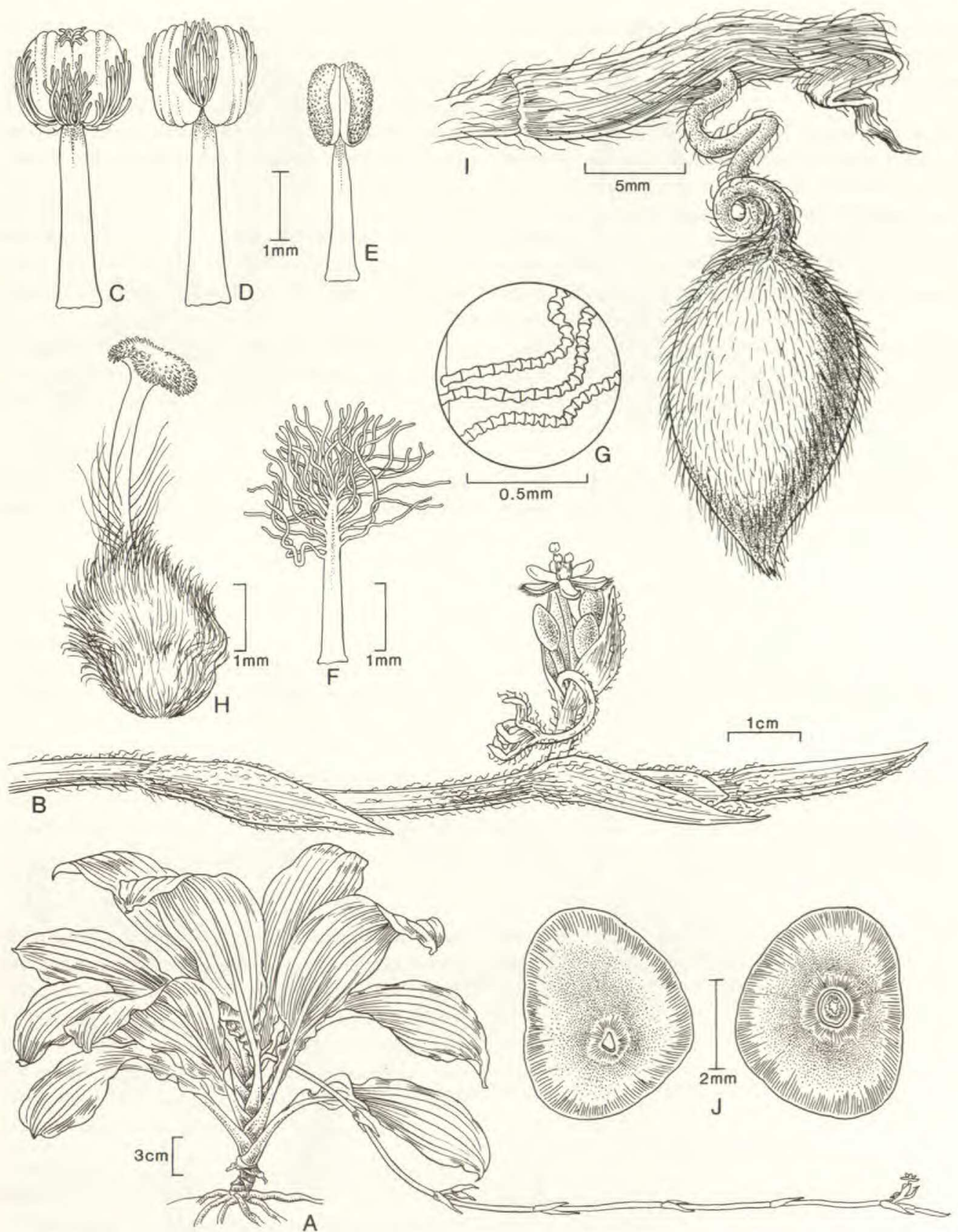


Figure 1. *Palisota flagelliflora* Faden. —A. Habit, showing flagelliform flowering shoot. —B. Inflorescence terminal on flagelliform flowering shoot, the shoot growth continuing sympodially from the axil of the bract at the base of the peduncle. —C. Unpaired stamen, bisexual flower, ventral view. —D. Unpaired stamen, bisexual flower, dorsal view. —E. Paired stamen, dorsal view. —F. Paired staminode. —G. Staminode filament hairs. —H. Gynoecium, lateral view. —I. Fruit, showing contorted pedicel. —J. Seeds, dorsal and ventral views. All from Faden & Mbamba 86/50.



Figure 2. *Palisota flagelliflora* Faden. —A. Male flower, front view. —B. Male flower, side view. —C. Bisexual flower, front view. —D. Bisexual flower, side view. All from Faden & Mbamba 86/50.

coming spirally contorted in fruit, 1.5–3.5 cm long, white, sometimes tinged with reddish purple, pilose; sepals subequal, boat-shaped, lanceolate-oblong to oblong-elliptic, (3–)6–7.5 mm long, 2–3 mm wide, reddish purple outside, the color shining

through, densely hirsute with reddish hairs forming an apical tuft, usually intermixed with finer, shorter, white hairs; petals subequal, outer slightly broader than the others, elliptic, (4–)6 mm long, (2–)3–3.5 mm wide, white, inner petals oblong to spatulate-

oblong, (4–)6.5–7 mm long, (1.5–)2–2.5 mm wide, usually white, sometimes maroon with white margins; unpaired staminode lacking or with a filament 1.5–2 mm long and bearded subapically with apparently moniliform, white-based yellow hairs; paired staminodes with filaments 2–3 mm long, white, bearded in the distal half with hairs like those of the outer staminode; paired stamens with filaments (2–)3–3.5 mm long, glabrous, white, anthers broadly elliptic to oblong-elliptic or ovate-elliptic, (1–)1.5–1.75 mm long, 0.7–1 mm wide, dehiscence extrorse, connective yellow, glabrous, pollen yellow; unpaired stamen dimorphic, in bisexual flower slightly shorter to slightly longer than the paired stamens, filament (1.5–)2.5–3.5 mm long, strongly declinate, white, usually densely bearded with minute yellow hairs just below the anther, anther broadly ovoid, ca. (1–)1.8 mm long and wide, yellow, pollen sacs C-shaped, indehiscent, connective usually densely bearded with minute yellow hairs; in male flower unpaired stamen distinctly longer than the paired, more central in the flower, usually not declinate, filament ca. 5 mm long, white, bearded at apex, as in bisexual flower, anther similar to that of bisexual flower, including densely bearded connective, but smaller (ca. 1.4 mm long and wide) and pollen sacs dehiscent, introrse, with pollen concolorous with that of the paired stamens; gynoecium reduced and apparently abortive in the male flower, in the bisexual: ovary ovoid, deeply 3-lobed, ca. 2–2.5 mm long, densely pubescent with forward-directed, white or reddish hairs, locules 5–7-ovulate, ovules biseriate, style exceeding the stamens, 3.2–4 mm long, straight or declinate, yellow, sparsely bearded basally with appressed hairs like those of the ovary, stigma deeply 3-lobed, yellow with a central brownish area. Fruits triangular-ellipsoid to triangular-ovoid berries, acute to beaked at the apex, 1.4–2.3 cm long, 0.9–1.2 cm wide, scarlet or reddish brown, densely reddish pilose. Seeds uni- or biseriate, 1–4 per locule, ovate-triangular in outline, ca. 4–5 mm diam.

Habitat. Secondary and exploited forest, 10–520 m.

Flowering. January, February, July, September. In cultivation the flowers open at about 0940 and begin to fade at 1230–1330.

Distribution. Endemic to Cameroon.

Palisota flagelliflora is unique in *Palisota* because of its flagelliform shoots, bract-opposed inflorescences, and vivipary. It may further be distinguished by its inflorescences composed of a single cincinnus, long pedicels, large, often vertical flowers, yellow staminode filament hairs, bearded sta-

men filament and connective in the unpaired stamen, and bearded style. It also has the earliest flower opening time for any *Palisota* species thus far recorded or observed.

In the above description the dimensions of the floral parts were measured from preserved flowers of a cultivated plant of *Faden & Mbamba 86/50*. The much smaller dimensions for some parts, listed parenthetically, came from a pressed flower on a small plant of *Leeuwenberg 8296* (WAG). No field-preserved flowers were available. The larger flowers were the largest observed in *Palisota*.

The staminode filament hairs were described above as “apparently moniliform” because of the beadlike appearance of the cells at low magnification. However, higher magnification (Fig. 1G) revealed that the cells of the hairs were individually dumbbell-shaped, not spherical or ellipsoid, as in typical moniliform hairs.

The nature of the flagelliform shoots requires some comment. Morphologically they could be considered one of the following: long, axillary inflorescences; axillary shoots bearing terminal inflorescences; inflorescence-shoots; or stolons bearing inflorescences. Their actual structure is clear, so the problem is more semantic than morphological. Forman (1962) tried to distinguish between an axillary inflorescence and a reduced axillary shoot bearing a terminal inflorescence, which he termed an inflorescence-shoot. Faden (1991: 11) found the difference between the two, which was based on the absence (inflorescence) or presence (inflorescence-shoot) of a basal prophyll, not very useful because the whole range from leafy lateral shoots with a terminal inflorescence to reduced lateral shoots with only bracts (inflorescence-shoot) could be found within a single plant in some *Aneilema* species. The axillary inflorescence might have evolved by further reduction, namely loss of the prophyll.

Many forest Commelinaceae produce stolons: axillary, elongate, horizontal shoots with only leaf sheaths basally (Faden, 1988). Distally stolons produce new vegetative shoots, not inflorescences. The inflorescence-terminated shoots of *Palisota flagelliflora* are dissimilar because they bear only bracts and they are primarily for sexual, not vegetative, reproduction. When they viviparously produce a new plant, they are more like the reproductive shoots of the epiphytic *Belosynapsis vivipara* (Dalzell) C. E. C. Fischer than like stolons of other terrestrial species. Because they are unique in *Palisota*, and perhaps within the family, I have used the term “flagelliform shoots” to describe them.

The regularly biseriate ovules were a surprising find in view of the fact that the seeds may be uni-

seriate. The alignment of the seeds in the fruit seems to be a function, at least partly, of seed number per locule. When three or fewer the seeds appear uniseriate, when four or more, biseriate. Only two fruits were available for dissection, so which of these arrangements predominates and whether more seeds are ever present is unknown.

One of the two sheets of *Leeuwenberg* 8296 (WAG) bears two small plants each with a short inflorescence (only 1.5 cm long in one case). Had these been the sole plants collected, treating them as *Palisota flagelliflora* would have had to have been based largely on the very long pedicels and bearded connective of the unpaired stamen. The second sheet, as well as specimens of this collection seen elsewhere, clearly demonstrate that the small plants are merely young *P. flagelliflora* with short inflorescences.

Faden & Mbamba 86/47 was noted in the field as differing from *Faden & Mbamba* 86/50 in not forming dense stands, in being sterile (it had produced new rosettes at the ends of axillary, flagelliform shoots), less robust, with a reddish petiole and smaller, less discoloured lamina more abruptly narrowed into the petiole, and with smaller bracts on the flagelliform shoots. Although exact chromosome counts were not obtained from either population, $2n = ca. 40$ (approximately diploid) was counted for *Faden & Mbamba* 86/47 and $2n = ca. 60$ for *Faden & Mbamba* 86/50 (approximately triploid). *Faden & Mbamba* 86/50 was selected as the type, despite its being possibly triploid, because abundant reproductive material was present in the field, including ripe fruits and buds, and that population also flowered in cultivation, whereas *Faden & Mbamba* 86/47 did not flower before it died.

The inclusion of *Bos* 3877 in *Palisota flagelliflora* was questionable. Although it came from very close to the type locality, it differed most obviously from the other collections by its broader leaves, more robust flowering shoots that perhaps were not lying in the leaf litter, peduncles completely covered by lanate, brownish hairs, and by lacking sterile bracts between the bracts at the bases of the peduncles. Dissection of flower buds, nearly all partly eaten or bored, revealed that all three stamen filaments and connectives were glabrous, differing from all other collections of *P. flagelliflora*. In the absence of a larger number of collections, *Bos* 3877 is provisionally included in *P. flagelliflora*.

Bos 3877 approached *Palisota lagopus* Mildbraed in robustness and peduncle pubescence, differing most obviously by its longer, axillary, sympodial flowering shoot with several inflorescences and longer, spirally contorted fruiting pedicels. Its

somewhat intermediacy between this species and *P. flagelliflora* suggested a possible hybrid origin, but it could just as readily represent an undescribed species or a form of *P. flagelliflora*.

Palisota flagelliflora is an understory species that has been collected in secondary and exploited primary forest. It should also occur in undisturbed primary forest. In Littoral Province the primary vegetation at the locality for this species would be "Atlantic forest of the northwestern type with Caesalpinaceae rare" (Letouzey, 1985). At the localities east of Kribi the primary forest type would be "Atlantic littoral forest with Caesalpinaceae relatively rare, with *Saccoglottis gabonensis*" (Letouzey, 1985).

In the field *Palisota flagelliflora* may form dense stands because of its ability to reproduce vegetatively. That tendency, along with the small size of the rosettes, compared to other species, allows it to be spotted from a distance. Closer up, the flagelliform shoots and vivipary are very distinctive, as is the presence of hairs on the connective and filament apex of the unpaired stamen.

Palisota flagelliflora appears related to the red-fruited species of *Palisota* because of its fruit color, hairy fruits (glabrous in some species), persistent faded flowers, and long, spirally contorted fruiting pedicels. Most of those species, such as *P. barteri* Hooker and *P. mannii* C. B. Clarke, have uniseriate seeds and would thereby belong to section *Monostichos* C. B. Clarke. *Palisota flagelliflora*, however, with its biseriate ovules and sometimes biseriate seeds, would have to be placed in section *Palisota* (synonym: section *Distichos* C. B. Clarke, 1881: 133) with the blue- and black-fruited species such as *P. ambigua* (P. Beauvois) C. B. Clarke and *P. hirsuta* (Thunberg) K. Schumann. This apparent anomaly may be explained either by Clarke's sections being unnatural, which well may be the case, or by seed arrangement not always reflecting ovule arrangement, about which we have insufficient data.

Palisota flagelliflora is probably most closely related to *P. satabiei* Brenan and *P. bogneri* Brenan, small, red-fruited species with axillary inflorescences, biseriate ovules, and, like *P. flagelliflora*, a restricted distribution in the species-rich coastal forests of Cameroon and Gabon. *Palisota flagelliflora* uniquely shares with *P. satabiei* the features of the inflorescence consisting of a single cincinnus, yellow staminode filament hairs, bearded anther connective, and bearded style. Preserved fruits of *P. satabiei* (*Satabié & Letouzey* 384, YA) showed partly biseriate seeds in one locule, as in *P. flagelliflora*.

Palisota flagelliflora, *P. satabiei*, and *P. bogneri* extend the range of habit and inflorescence types previously known in *Palisota*: decumbent habit (*P. satabiei*), vivipary, strictly axillary inflorescences, inflorescences composed of single cincinni, and flagelliform flowering shoots. My research on the Commelinaceae of Cameroon has revealed additional habit types in the genus: scandent (to 15 m in length) in *P. thollonii* Hua, and decumbent with a terminal thyrse in an undescribed species from Cameroon and Gabon. The diversity of habit types now known within *Palisota* rivals that in the much larger neotropical genus *Dichorisandra*, which is the ecological counterpart of *Palisota* in South America.

It should be noted that the bisexual flower depicted in Figure 2 has the lower (unpaired) stamen longer and less declinate than in the most extreme cases. Insufficient flowers have been examined to generalize about the "typical" curvature and length of the filament.

Paratypes. CAMEROON. **Littoral Prov.:** Forêt du Bukaka, 3 km E of Ebené, a village on km 11 Nkongsamba-Loum road, 4°50'N, 9°54'E, alt. 520 m, 8 Sep. 1971, *Leeuwenberg* 8296 (US, WAG—2 sheets, YA). **South Prov.:** ca. 18 km from Kribi, Lolodorf road, 3°00'N, 10°02'E, 5 Feb. 1969, *Bos* 3877 (WAG, YA); 4 km N of km 20 Kribi-Lolodorf, 3°02'N, 10°03'E, 4 July 1970, *Bos* 7014 (US, WAG—3 sheets, YA); Kribi-Lolodorf road, km 20, end of track ca. 2 km N of the road, ca. 3°01'N,

10°03'E, alt. 10 m, 29 Jan. 1986, *Faden & Mbamba* 86/47 (P, US, YA).

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